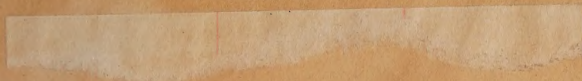


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OBSERVATIONS
ON THE
PROPAGATION AND MANAGEMENT
OF
OAK TREES IN GENERAL;
BUT MORE IMMEDIATELY APPLYING TO
HIS MAJESTY'S
NEW-FOREST, IN HAMPSHIRE,
WITH A
VIEW OF MAKING THAT EXTENSIVE TRACT OF LAND
MORE PRODUCTIVE OF TIMBER,
FOR THE USE OF THE NAVY:
IN A
LETTER,
ADDRESSED TO
THE RIGHT HONOURABLE
JOHN EARL OF CHATHAM,
FIRST LORD COMMISSIONER
OF THE
ADMIRALTY.

By *T. NICHOLS*,
PURVEYOR OF THE NAVY FOR PORTSMOUTH DOCK
YARD.

SOUTHAMPTON: PRINTED BY T. BAKER.

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Nichols

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OFFICE

OBSERVATIONS

ON THE

PROPAGATION AND MANAGEMENT

OF

OAK TIMBER.

REDBRIDGE, MARCH 1, 1791.

MY LORD,

I BEG to lay before you some account of what in my opinion may be necessary to be done in the *New-Forest*, in order to make it more productive of timber for the use of the navy, as there has certainly been a great decrease of large timber in the kingdom within these few years, owing to the vast

quantities used in the king's and private yards, and that care not having been taken to keep up a succession either on private estates or the king's forests as the increased demand and magnitude of the object required.—This my Lord you may be assured is no chimera, but an alarming fact, of which I am convinced, from a knowledge of the timbered state of the country in general.—Still it may not be too late, with becoming perseverance and exertion, to recover what has been so much neglected, at least, so as to prevent any material ill effects arising from it,—this very serious and national concern, therefore, I most humbly recommend to your Lordship's consideration.

As this great tract of land is so conveniently situated for conveying timber to the dock yard at Portsmouth, and the whole expence of both land and water carriage being little more than fifteen shillings *per* load, and when it is known to produce timber of the best forms and sizes for ship-building, of as good a quality as timber in general, from which
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also arises a great number of *fine knees*, which are scarce and difficult to obtain at any price. —There can be no doubt, but every means should be pursued to make it what it ought to be, and what it is capable of being made; one of the first nurseries for timber perhaps in the world.----And if that mode should be adopted which is necessary and should its cultivation and management be according to the ideas I shall advance, I believe, it may be made to produce a quantity of timber sufficient to supply the whole demand for Portsmouth yard.-----If for example, only twenty thousand acres out of the whole space of land, which contains about sixty-four thousand, were well laid down in wood, and after a certain time, one tree from four acres was annually cut, and one tree with another to contain eighty feet, the yearly amount would be no less than eight thousand loads of timber, (and worth more than thirty thousand pounds) which is the full quantity used in Portsmouth yard: at present there are only one thousand loads of oak and two hundred of beech supplied from the Forest for naval uses;

uses; which is as much as it is capable of maintaining, and that not for a long continuance, unless, there is more care and attention paid to its preservation than there has been of late years.-----I am well aware how calculations of this kind are liable to error and likewise how much the success of every great undertaking depends upon the activity, diligence and judgement of the people intrusted with the execution of it—yet from mature consideration, I am persuaded, that this extensive Forest, may with some tolerable management be brought to produce the quantity of timber I have mentioned, without giving offence to the claimants or encroaching on their rights; the particular means of effectuating which I shall now endeavour to point out.

First,—The flat and swampy lands, where there are woods or plantations, should be immediately drained, as nothing contributes more to the health, and growth of oak trees than keeping the land dry, by having drains properly made, so as to prevent the roots of
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the trees being chilled, or soaked in water, for whenever this happens, the roots which are the conductors of nutriment, become overcharged with watery particles, whereby, the assimilating powers are destroyed and vegetation is checked, the consequence of which is, the trees soon die,—This is to be seen in many parts of the forest, particularly in the low places in *Irons-Hill*, *Castle-Malwood*, *Ashurst* and *Denny Walks*, where there is a vast number of trees dead, or dying of a small size, which would have grown to large dimensions had this necessary work been accomplished in due time; the soil being remarkably good, and the dry and healthy parts producing some of the largest and best timber of any in the forest, and taking one with another, the distance of these walks is not more than five miles from the shipping place.—It is to be observed, that on all rising and hilly lands, where the soil is kind to the growth of timber and the trees are kept at a proper distance from each other, they will be seen healthy and flourishing, of which no place affords a better example than the *Forest of Dean*.

Whenever

Whenever plantations are intended to be made or woods raised, this necessary business of draining, should be one of the first things to be considered, and attended to, for on this, the success of the undertaking must in a great measure depend.

As nothing assists more in the preservation and propagation of timber trees than thorns and bushes of all kinds, especially, where there are no fences to keep off the cattle; there can be no better guard or fence; and whenever underwood is suffered to stand in open places, it never fails to bring a stock of timber, provided the soil is friendly to the growth of it.—This must be evident to every one who has taken the least notice of wood-lands, or how trees are propagated, and it must be equally so, that by whatever means the bushes or under-wood are destroyed, where the lands are not inclosed, it will most assuredly prevent a succession and increase of timber; as by which, the young timber plants are deprived of their protectors and nurses, or destroyed with them

them, and by this means also, those plants which come up from the acorns or seeds that are dropped by the birds or other casual means, are left open and exposed to various enemies and are soon destroyed, which otherwise would be a great source of propagation.—From these observations confirmed by experience, it is certain that the constant cutting of the thorns and underwood of all sorts in the forest by the keepers, under the pretence of browse for the deer (by the sale of which some of them are known to gain very considerable annual emoluments) must be attended with the most mischievous consequences to the growth of the timber.—Therefore, if the deer were removed (as recommended by the commissioners of the land revenue) it would not only put a final stop to this very destructive practice, but the fences of the inclosures would be kept up at a much less expence than at present, as well as others made at a cheaper rate ; it not requiring so high, or expensive a fence to keep out cattle as deer; nor indeed, would it be ne-

cessary to have so many inclosures, as the trees would be propagated naturally, by the assistance of the bushes.—The keepers also, instead of being employed in looking after the deer for the accomodation of a few individuals, at the public expence, (which operates in the destruction of the timber) might be much better engaged in taking care of the woods, which would be productive of real benefit to the country: I mean not by this, to cast the least odium on this set of men, on the contrary I think them very active and diligent; and that they would be extremely useful, were their attention directed to proper objects,

If the mowing of fern is allowed (though it is prohibited by the forest laws) it should be confined to such particular parts of the forest, as where it could do no damage and where the officers should point out; the present mode of doing it being extremely injurious, as the plants of all kinds are cut off almost as soon as they come up, and of course the woods are prevented extending themselves,

themselves, and the detached, and intermediate parts thereof from uniting, which they would do, was this indiscriminate destructive practice discontinued.-----Mr. MORTIMORE in his Husbandry says, that “ trees planted where fern grows are observed to thrive very much, even though it be upon a hot gravel; the reason of this is, that the fern shades the roots and keeps them moist and cool.”

Much to the shame and disgrace of those who have had the management of the forest either from neglect, connivance, or design, they have suffered many parts of it, and some of the inclosures, to be entirely overrun with rabbits, to such a degree, that there is not the least vestige of timber or plantation to be seen, only the fences, and those in extreme bad condition, particularly *Wilverly Inclosure* of about five hundred acres of good land and well situated for the growth of timber, and which have been known to produce trees of very large sizes; but it is impossible there can ever be any more

come forward, so long as these destructive vermin are suffered to remain, and their propagation is encouraged by the keepers in the manner it is.—It will be to very little purpose, therefore, either to fresh plant, or repair the old enclosures, or make others, in the parts so infested.-----Several feint attempts have been made to destroy these animals, but I believe they are now more numerous than ever; and so long as it is the interest of the keepers to encourage their increase, and they the only people employed to destroy them, it is not likely that this great evil will very soon be removed.---Hence it must appear how essentially necessary it is that some determined and vigorous means should be immediately adopted for their extirpation, not subject to be frustrated by the art or connivance of any interested people.

One of the most essential things to be observed in the management of oak woods, if the plants have been raised pretty close together as they always should be, they,
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thereby support each other, and are sheltered from the inclemency of the seasons, for the first twelve or fifteen years, is, the judicious thinning of them from time to time, until the trees are reduced to a proper number, and stand at a distance to grow to maturity; this must depend on the judgment of those people who have the management of them; first considering the nature of the soil, and the uses to which the trees, are to be appropriated.—Was this work properly done, I believe it would be found (after drawing much useful timber) that upon land of a middling quality, there would be forty or fifty trees, growing upon an acre and arrive at a size in about a hundred or a hundred and twenty or thirty years, sufficiently large for naval purposes of a superior kind, and worth at least six pounds a tree one with another.----By this reckoning they would stand at about thirty feet apart, which space I think quite enough to admit of their coming to full growth and expansion, if the soil runs deep; in confirmation of this idea, there are to be seen
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in many parts of the forest, from forty to fifty fine oaks standing on an acre, and will measure one with another two loads a tree. I have been more particular on this head as it has been said by some, that nine or ten trees are sufficient to grow upon an acre of land.—When oak trees stand at a great distance from each other, on a deep soil, they have generally large heads, and contain a great quantity of timber including the limbs or branches of each taken collectively with the body; the trunks are commonly large and short, consequently not so valuable for ship-building, as if they were longer, which they would be if they were suffered to grow nearer together, in which case, part of the timber that would be expended in the tops, would be drawn into the bodies, and of course, a greater quantity of useful timber produced in a tree, and more trees on the same quantity of land.—I judge that oak trees thus raised would by the time before mentioned contain one with another about ninety or a hundred feet, which is larger than the average

verage meeting of timber received at the king's yards, and sufficiently large to keep up the navy upon its present establishment.

Several of the woods in the forest, are almost ruined for want of this necessary work of thinning them; and its being done at proper times; particularly the inclosures which were made in the year 1700;—These were originally well planted and great quantities of trees brought up in them, which now remain so close together, that they are nearly stagnated, particularly in *Salisbury Trench*, *Brimly Coppice*, and *Woodfidly*; and although it is ninety years since they were planted, the trees will not measure one with another above six or seven feet a tree, whereas, if this business of thinning had been done as it ought, the remaining trees would by this time, have been of a size nearly fit for naval uses, as in some of the woods that were planted at the same time, the trees which have had room to expand and a free air admitted to them will measure from seventy to eighty feet.—But notwithstanding this
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great neglect and inattention, I think these woods may, by immediate care and exertion in thinning them, be brought about and made of great value and benefit to the country; care however must be taken not to cut too many trees in a wood in one season, as by so doing, such as remained standing would of a sudden become too much exposed to the weather and thereby be liable to be chilled and stunted; which frequently happens by the injudicious manner of thinning woods. —I think it would be of much service to the forest in general, if the superintending officers had discretionary power and orders constantly to select and mark for felling all such small oak trees as were unthrifty, or impeded the growth of others, which were flourishing, or such as appeared likely to become fit for naval uses, and indeed, wherever, they should see it necessary to give room, or think it beneficial.----In doing of which all the trees should be marked with progressive numbers on their sides, with black paint, their estimated contents taken and places where standing, together with
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their value, with a reserve of, and a different mark put on all such as may be found fit to be converted into tree nails, or any other naval uses, though necessary to be felled before they arrive at their full growth and maturity. There should be likewise, a regular report of the whole made annually to the treasurer, nor should any be felled until an order from thence; the same should then be sold by auction, or otherwise properly accounted for.—This business only, if well conducted would be the means of making the forest, much more productive of timber for the navy than it is at present.

The claimants being suffered to go into the woods to fell the trees that are assigned for their fuel wood, I apprehend is attended with consequences extremely detrimental to the forest.—Although care is taken to select and mark for this purpose, nothing but scrubbed or defective beech trees, or such as impede, or obstruct the growth of the oak; and the several allotments are made as near as possible according to the

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several claims, by the purveyor and deputy woodward, in the presence of some of the regarders, and accounts given to the keepers of the assignments with directions to see that no other trees are felled but those of which they have an account; yet as most of the trees are sold and applied to other uses than that of fuel, as trucks, rails, bedsteads, boards and many other articles, and saw pits dug in the most convenient places of the forest and among the woods for the purpose of manufacturing of them, -----notwithstanding the Act of the 10th of King WILLIAM the Third made for the increase and preservation of timber in the *New-Forest*; which declares that no one shall fell or otherwise dispose of their fuel wood.—It is evident from this representation, that there are great openings for fraud and strong inducements to take such trees as will best suit the purpose of the dealers, and such as have not been assigned, particularly as the means of detection are not very easy. As well as there is every reason to believe that there are great abuses committed

mitted by this mode of cutting the fuel trees; it must be observed besides, that there is much damage done to the woods by the careless manner in which they are felled, and I fear too often with a design of doing damage.—To remedy this evil (as as I have before proposed in a letter to SIR CHARLES MIDDLETON) the trees allotted for those who have just claims for fuel wood should be felled, cleaved and corded under the direction of the forest officers, and delivered to the claimants in their several proportions according to their allowed claims; this would not only prevent many depredations being committed, but most likely, greatly lessen the quantity of fuel trees that are assigned annually; which is between three and four thousand, and the number of loads being eight hundred and forty-six and the number of claimants for fuel two hundred and fifty.

The encroachments made on the forest within these few years have not been many nor of much consequence, and I judge, if the

verderors were to hold their courts regularly and punish the trespassers by fine as they have done lately, and the officers and keepers were active in throwing out the land when illegally taken in, it would soon put a stop to this practice altogether; as I believe, the boundaries of the forest are sufficiently ascertained and known, by the survey and plan taken under the directions of the commissioners of the land revenue, to prevent any disputes arising on this head.—

The worst effects that have arisen from encroachments on the forest, I take, to have been the cottages, whose inhabitants are continually committing depredations on the woods, by lopping, cropping and stealing the trees; which is the case, in the neighbourhood of all the villages in and about the forest, where there are woods, and the damage done near *Cadenham* and *Lyndhurst*, is very great and shameful, and I have no doubt, but these depredations may be prevented with proper exertion.

As all the different ways known of making

king plantations and raising woods of all kinds of forest trees are fully and minute-described by Dr. HUNTER, in his edition of EVELYN'S SILVA.—I shall presume only to make a few observations on this head, and suggest what I judge necessary to be done in the forest, in order to extend the woodlands, by making inclosures for that purpose.

The forest consisting of a great variety of soils,—the first object, in my opinion, should be the proper choice of spots and situations, such as where the soil is most congenial to the growth of trees, regard being had to its vicinity to the shipping places for timber.—On these spots, inclosures should be made of such sizes as the nature of their soil and situation may point out—fenced in with a wide and deep ditch, with posts and rails securely placed in the banks so as effectually to keep out deer and cattle,—many good patterns of these are to be seen in this neighbourhood on private estates,—gates and bridle ways should
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be made in several parts of the fences, where thought necessary; and wide openings or roads set out and left across and athwart the spots intended to be inclosed, not only for admitting carriages and sporting gentlemen to pass, but to admit fresh air to act on the woods; which will very much contribute to their health and prosperity; this is what should be always attended to in making plantations.-----The land should be drained if required; and at all events trenches should be cut and outlets made to carry off the water, in order to keep the land dry and healthy.——After this work is well done, the ground will want little other preparation, only that of digging small beds at about a yard apart and putting an acorn in each (one I think quite sufficient) placed about two inches deep in the earth, which when completed, the different kinds of underwood seeds should be distributed over the whole (particularly of the white and black thorns) as the plants of every sort should be brought up thick together; as by this
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mode of planting, they will protect each other from the inclemency of the weather, and if the plantations should be in bleak situations, they may be sheltered by screens of firs; and if after twelve or fifteen years the plants come up well and strong, the thinning should commence and be continued from time to time, as have been before observed.-----But in order to ensure the successful growth of the plantations, I would recommend, that three or four small nurseries of about two acres each should be made in different parts of the forest, for raising oak plants, in order to be removed into the inclosures, to supply any deficiencies that may happen from the planted acorns not taking effect.----In planting the inclosures, particular attention should be observed in the choice of the acorns; which should be taken from the most healthy and flourishing trees, of the true English oak, such as are standing about *Rinefield Lodge*; finer trees, or better timber for ship-building, than which they are, I believe, are not to be found in the
kingdom

kingdom.——I mention the true english oak, because there are two different sorts of oak growing in the forest, one the true english, the wood of which, for firmness, strength and durability, is preferable to any other, for ship-building, and is well known all over the world; the other is called by the woodmen in the forest the dur mast oak, which I believe to be the second sort of oak, described by Mr. MILLER in his GARDENERS DICTIONARY, the wood of which is not so strong, hard, or durable as that of the english.—For want of this caution, or perhaps, the difference was not then known; some of the inclosures that were made in the forest in 1700 were planted with acorns taken from the dur mast oak.---I take notice of this circumstance that in future this error may be avoided in making plantations.——I recommend this method of making plantations, without any previous preparation of the land, as being the cheapest, and is found to answer extremely well; those that were made in the forest in 1700 were all done so, and the plants come up
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in them, thick and well, and some of the woods are now very fine and flourishing.

Timber trees of all kinds intended for use or profit, should be felled as soon as they arrive at their full growth and maturity.----This will be at different periods, from the time of their being planted, according to the depth and goodness of the soil they stand in, and the nature of the timber---after this period they will gradually decay, and generally in proportion to the times of their arriving at perfection—which indeed is the fate of all animal and vegetable life.

As oak is the only timber of any consequence made use of in building ships for the navy (or I believe, ever will be with good effect) and as from my situation, I am acquainted with the great difficulty of obtaining timber of the different forms and sizes for that purpose, as well as the quantity that is necessary, to support and keep up the navy upon its present

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sent formidable establishment; my present observations are particularly directed to the cultivation of oak trees and therefore cannot help expressing a wish, that gentlemen would pay more attention to this very important subject; as I am convinced that their attention would be repaid with double advantage and security.

From every information I have been able to collect, I judge, that the times at which oak trees arrive at maturity, from their first planting, are, from one hundred, to one hundred and forty years, this however depending upon a variety of fortuitous causes;—I believe, there can be no predetermined time fixed.—The only certain criterion by which a good judge never can be deceived, is the appearance of the trees themselves, the period of their maturity and decay, being as clearly and strongly indicated by their appearance, as when any fruit or grain is ripe---and for the good of the forest, it should be an invariable rule, in felling the trees for the
navy,

navy, to select such only as are past improving, which practice, I have steadily pursued, since this business has been under my management——and if a regular succession of trees is intended, whether it be on open or inclosed lands, it is a rule that should never be departed from--for you cannot do woods a greater injury than by felling the growing, flourishing trees, and leaving the old decaying ones standing, for in so doing, you take away those that would improve and pay extremely well, and leave the others to spoil and incumber the land, to the loss of both the timber and its value,—which I am sorry to say was the practice prior to my coming to the forest, the consequence of which has been, the navy for these last eight years, has been supplied from thence, with much defective timber, and a great number of trees, which had they been felled in due time would have been sound and good, have been entirely thrown away, on account of their defects.—The following observations which I lately submitted to the commissio-

ners of the land revenue, I take the liberty to remark now—"after the trees in the forest are felled for the navy; I rase off their tops (which is marking the trees where the tops are to be cut off, reserving what is fit for the navy) these are valued by the regardsers present, and afterwards sold by the deputy surveyor, and left to be cut off by the purchasers.—The cast timber rejected on the survey is also valued by the regardsers and left for sale, under the charge of the deputy surveyor.—This is the mode in which this part of the business has hitherto been carried on; but I beg leave to suggest, that there appears to be an impropriety in leaving the tops to be cut off by the purchasers; and would recommend that they should be cut off at the expence of the crown, it being almost impossible to prevent the hewers from being secretly connected with the purchasers; and I believe that advantages have sometimes been taken of the opportunities thereby afforded, of cutting off more than was intended to be sold.

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If the foregoing observations should be thought just, and the mode I have pointed out of consequence sufficient to be carried into execution, and should the six thousand acres of land be kept constantly well inclosed and diligently attended to, as government has a right to do, and what in my opinion ought to be done; all the parts of the forest which are applicable to the growth of timber would, I conceive be gradually brought into woodlands, and yield a regular and large supply of fine useful timber for the navy; as well as ensure a continuance of the fuel wood and repair timber to the claimants, who would also, peaceably enjoy their rights of depasturing their cattle in an extensive manner on the open parts, without being injurious to the young trees, especially if the underwood was preserved and the growth of it encouraged (in the manner I have before recommended) particularly of the white and black thorns. I lately surveyed a very fine parcel of timber for the navy, (the purchase of which was upwards of eleven thousand

and pounds) upon an estate belonging to SIR HARRY ST. JOHN near *Troyford*, that had been entirely brought up on unclofed lands (where the tenants of the manor have a right of commonage and on which they depasture a great many cattle) by the protection of the white and black thorns, and there is now standing on those very lands a vast number of fine oaks in fucceffion, fupported and guarded by the fame means: and there was felled on the fame lands about forty years ago the like quantity and one thousand four hundred pounds worth fix years ago: and from the waste lands of another estate, well known in this neighbourhood, there has been fold more than twelve hundred pounds worth of timber a year for these laft twelve or thirteen years, and there is now a great flock of timber remaining.—These are fuch striking proofs amongst the many that may be adduced of the utility of encouraging the growth of bushes in bringing forward crops of timber trees upon open lands, that it is worth the attention of gentlemen, who
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wish to improve the wastes of their manors in the most advantageous way, and the curious and well wishers to their country, would receive much pleasure in seeing how trees are propagated spontaneously or rather without the assistance of art.

After what the commissioners of the land revenue have so justly and judiciously represented and proposed in their report to parliament respecting the government of this forest, it is wholly unnecessary for me to say any thing on this head.

The proper season for felling oak trees, so as to render timber most durable, has been a subject of much speculation and enquiry; and it is now a general and received opinion that, the wood of oak trees felled in the winter months with their bark on, will endure longer, than that of those felled in the spring of the year when the bark will strip.----But I know of no experiments that have gone to prove this in a satisfactory manner.—Yet government from an idea of
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this being the fact, has been induced to allow the timber merchants seven pounds five shillings in addition to the usual prices for every hundred pounds worth so felled for the use of the navy,—allowing however this to be the fact, which is by no means certain, the manner in which it is used in the king's yards, must totally destroy its utility, by being as it is, indiscriminately applied with timber felled in the spring, in the building or repairs of ships.—If there is any benefit to be derived from winter felled timber, it ought most assuredly to be used apart and not mixed with any other in the same ship.—Supposing ships were wholly built with winter felled timber; would not the public sustain greater certain injury, by the additional price that must be given for it, and the loss of the bark than they would be benefited by supposing them to last something longer.

It is well known that oak timber of a good quality, when worked and placed so as the air may act freely on it, and not
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too much exposed to the inclemency of the atmosphere, whether it be felled in the winter or the spring, will endure time immemorial.

The quick decay of our ships of war, has given rise to many schemes and methods to prolong their duration, and government has been at considerable expence in putting them into execution, but experience has proved that not one of them hath hitherto answered the intended purpose,—Indeed, from the construction of ships, their many parts are so closely connected, and so come in contact with each other, that the juices of the timber which would otherwise evaporate and fly off, are in general so confined and surrounded with foul air, that they soon ferment, and bring on putrefaction and rottenness,—This naturally points out the necessity of the timber being well, and properly seasoned, before it is used in ship-building and as free a communication of fresh air admitted to it as possible, after being so used; this being the
Easiest

easiest and I believe, would be found, the most effectual means of prolonging the duration of our navy,—and if ships were to be built in the dry, under some kind of covering (which in my opinion they might, and is what I suggested, some years ago in a letter to Mr. HUNT, late surveyor of the navy, who was of the same opinion, and approved of the idea) as it would contribute much to their preservation.—There can be little doubt of their receiving considerable injury during the time they are building in the present mode, by which they are so much exposed to the weather, that the sun and wind rend many parts of the timber and plank asunder, into which the wet of course gets, as well as many other parts that are in contact; and thereby, the foundation of their decay is commenced, there being no way of again making such places perfectly dry.

The COUNT DE BUFFON by his experiments on timber, has incontestably proved that by stripping oak trees of their bark
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in the spring of the year, and letting them remain standing till they die, before they are felled (which will be about the third year) the wood will become more solid and strong and probably more durable.

From this idea—I proposed to the navy board, to reserve all such small oak trees, as should be thought fit to be converted into treenails for the use of the navy, which may arise from the thinning of the woods in the forest, and to have them stripped of their bark standing; which proposition was acceded to,—and in the spring of 1789 I had four hundred trees stripped standing for this purpose, and thirty more in the spring of 1790,—and propose felling the first quantity in the autumn of 1792 and so on, at the same distance of time, as the trees are stripped from spring to spring.—Should the result of these experiments prove efficacious, it may be worth the attention of government to endeavour to make this practice as general as possible for all timber to be used in the navy.

As trees receive the principal part of their nutriment from the earth by their roots, and the larger and more vigorous these are, the greater quantity of nourishment they convey to the trees, and as they decay, or fail of their assimilating powers, their respective trees or branches also decay and perish,—and I have found more defective trees from the perishing of their limbs than from any other cause, and these defects generally begin to appear as the trees arrive at maturity and increase in gradual decay. This shews the necessity of felling all trees, which are intended to be used for timber as soon as they come to perfection.—The limbs frequently perish and fall off before the trees are ripe, owing, to the corresponding parts of the roots giving out; and very often I have known a vast number of fine trees entirely spoiled, owing to their limbs being lopped off by the cottagers; for by whatever means the limbs are separated from the trees while standing, it seldom fails to produce defects, except the small branches, that it perish and
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fall off as they advance in growth.—This evil might be remedied if taken in time, by the application of Mr. FORESYTH'S composition, which he has discovered for curing the defects in trees and for restoring their bark,—by the use of which composition, in his majesty's gardens at *Kenfington* (where Mr. FORESYTH is gardener) very surprising effects have been produced not only in curing defects but even in bringing forth entire new trees upon the old stems in a very short time; infomuch, that it may be called a recreation, for which in my humble opinion, it ought to be encouraged, as it promises to be of public utility.

Messieurs BUFFON and DU HAMEL have have found by their experiments, that where the limbs or branches of trees have been decayed, the roots on the same sides, or corresponding to them have been in a bad state (as there is certainly a connection between the branches of the heads and roots) and have also proved, that on the sides of trees where the ramifications of the roots are in the greatest abundance and most vigorous

vigorous, the annual ligneous coats of the trees are the thickest, and of course the most excentric from the hearts; caused, by a greater quantity of nutritive matter having been transmitted by the roots on those sides, than the others.

Trees of all kinds increase in their diameters by additional coats of new wood annually formed by the sap, between the bark and the coat of the preceding year, (by which the age of all trees may with certainty be obtained) and these coats never increase in thickness, after being so formed, though they do not become perfect wood, at their first formation, but are gradually matured to it by the assimilation of the juices, which are collected by the roots; and guided by the laws of divine providence, therefore, according to this theory; which is confirmed by experience, there is no expansion from the hearts of trees, as some have imagined, of this opinion Mr. EVELYN seems to have been, but he was certainly mistaken, and had not carried his researches sufficiently far to have obtained the truth

on

on this head, which he might have done, and been convinced of his error, by cutting out two pieces of bark of about five inches square, exactly opposite to each other from a young flourishing oak tree, and then taking the diameter of the tree upon the wood at that place, and also another diameter upon the bark at right angles from the former, at the same height, and kept the dimensions and compared them with the tree two or three years afterwards, he then would have found, that the size of the tree had been considerably increased at the place where the diameter had been taken on the bark by the addition of the annual coats, and remained just the same where the bark had been taken off,——for wherever any part of the bark of an oak tree is taken off the tree ceases to increase in size at that part, and is thereby, sure to receive considerable damage.

Trees increase also, in height by the repetitions of new shoots, and these shoots never extend in length after being once formed; therefore, according to this principle

ciple, trees do not increase in height, from their roots to the extremity of their branches, but from the extremity of their branches upwards-—This I know is contrary to the common received opinion, which is that every part of a tree grows gradually in height from the root upwards; but is not the fact, and of which any one may be satisfied, by measuring the distances from the root to any limb, or the distance between the limbs of a growing tree, and compare them at any future time, and it will be found that these distances have not increased in the smallest degree; which would have been the case, had the growth in height been gradual through all the parts of the tree.

I mean not to describe the anatomy or component parts of trees, or the uses of the several vessels in conveying and concocting the juices and forming them into nutritious and excrementious parts, and indeed it would be arrogant and ridiculous for me to attempt it, after having so learnedly and minutely done by Doc-

TOR HILL, DOCTER HUNTER, and others.
 —I only wish to ascertain how the several parts of trees are formed, from the operation of these wonderful combinations, and how trees may be produced and applied for the benefit of the country.

Oaks flourish best and grow the quickest in a rich, deep loamy soil, and I have found by experiments and general observations for more than thirty years, that the wood of such trees is of the firmest and best texture, and I believe, it will be so found in all the different species of trees, that grow the fastest; caused I suppose, by their annual ligneous coats being large; and the pithy substances which are formed between each being few in proportion.—The Count DE BUFFON has proved by many experiments that, where the ligneous coats are largest the wood is strongest and heaviest.

If the observations I have here made should in any way contribute to the cultivation and improvement of the forest lands with timber for the use of the navy, or

be the means of throwing the least light on the management and propagation of oak trees in general, I shall receive great pleasure; but be that as it may, I shall enjoy much satisfaction in having discharged what I conceived to be my duty in attempting it; being convinced that it is a matter of the greatest importance to the country, and at this time requiring particular attention.-----I therefore hope that your Lordship and others high in office, may think it a subject worthy your consideration, and pardon me for taking the liberty of laying before you these hints,—

And am

My LORD,

with great respect your

Lordship's most obedient

humble Servant.

THO. NICHOLS.

A T A B L E,

Shewing the number of Trees that will stand upon an Acre of Land at different distances from each other, from six to thirty-five Feet; by which may be known the number of Trees standing upon any given quantity of Land by taking their average distance.

| Trees to stand distant from each other. } | Feet. | | | Number. | Will stand upon an Acre of Land. |
|--|-------|----|----|---------|-------------------------------------|
| | 6 | -- | -- | 1210 | |
| Ditto | 7 | -- | -- | 888 | Ditto. |
| Ditto | 8 | -- | -- | 680 | Ditto. |
| Ditto | 9 | -- | -- | 537 | Ditto. |
| Ditto | 10 | -- | -- | 435 | Ditto. |
| Ditto | 11 | -- | -- | 360 | Ditto. |
| Ditto | 12 | -- | -- | 302 | Ditto. |
| Ditto | 13 | -- | -- | 257 | Ditto. |
| Ditto | 14 | -- | -- | 222 | Ditto. |
| Ditto | 15 | -- | -- | 193 | Ditto. |
| Ditto | 16 | -- | -- | 170 | Ditto. |
| Ditto | 17 | -- | -- | 150 | Ditto. |
| Ditto | 18 | -- | -- | 134 | Ditto. |
| Ditto | 19 | -- | -- | 120 | Ditto. |
| Ditto | 20 | -- | -- | 108 | Ditto. |
| Ditto | 21 | -- | -- | 98 | Ditto. |
| Ditto | 22 | -- | -- | 90 | Ditto. |
| Ditto | 23 | -- | -- | 82 | Ditto. |
| Ditto | 24 | -- | -- | 75 | Ditto. |
| Ditto | 25 | -- | -- | 69 | Ditto. |
| Ditto | 26 | -- | -- | 64 | Ditto. |
| Ditto | 27 | -- | -- | 59 | Ditto. |
| Ditto | 28 | -- | -- | 55 | Ditto. |
| Ditto | 29 | -- | -- | 51 | Ditto. |
| Ditto | 30 | -- | -- | 48 | Ditto. |
| Ditto | 31 | -- | -- | 45 | Ditto. |
| Ditto | 32 | -- | -- | 42 | Ditto. |
| Ditto | 33 | -- | -- | 40 | Ditto. |
| Ditto | 34 | -- | -- | 37 | Ditto. |
| Ditto | 35 | -- | -- | 35 | Ditto. |

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